SEQUENCE LISTING

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MCCORMACK, ASHLING
STAPELTON, CLIONA
BURKE, KEVIN
MOCKEL, BETTINA

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<140> 09/531,266
<141> 2000-03-20

<150> 60/142,915
<151> 1999-07-09

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<170> PatentIn Ver. 2.1

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act tgg ctc gac gac ctc tcc cgc gag cgc att act tcc ggc aat ctc    2557
Thr Trp Leu Asp Asp Leu Ser Arg Glu Arg Ile Thr Ser Gly Asn Leu
     15                  20                  25

agc cag gtt att gag gaa aag tct gta gtc ggt gtc acc acc aac cca    2605
Ser Gln Val Ile Glu Glu Lys Ser Val Val Gly Val Thr Thr Asn Pro
 30                  35                  40                  45

gct att ttc gca gca gca atg tcc aag ggc gat tcc tac gac gct cag    2653
Ala Ile Phe Ala Ala Ala Met Ser Lys Gly Asp Ser Tyr Asp Ala Gln
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atc gca gag ctc aag gcc gct ggc gca tct gtt gac cag gct gtt tac    2701
Ile Ala Glu Leu Lys Ala Ala Gly Ala Ser Val Asp Gln Ala Val Tyr
            65                  70                  75

gcc atg agc atc gac gac gtt cgc aat gct tgt gat ctg ttc acc ggc    2749
Ala Met Ser Ile Asp Asp Val Arg Asn Ala Cys Asp Leu Phe Thr Gly
         80                  85                  90

atc ttc gag tcc tcc aac ggc tac gac ggc cgc gtg tcc atc gag gtt    2797
Ile Phe Glu Ser Ser Asn Gly Tyr Asp Gly Arg Val Ser Ile Glu Val
     95                  100                 105

gac cca cgt atc tct gct gac cgc gac gca acc ctg gct cag gcc aag    2845
Asp Pro Arg Ile Ser Ala Asp Arg Asp Ala Thr Leu Ala Gln Ala Lys
110                 115                 120                 125

gag ctg tgg gca aag gtt gat cgt cca aac gtc atg atc aag atc cct    2893
Glu Leu Trp Ala Lys Val Asp Arg Pro Asn Val Met Ile Lys Ile Pro
                130                 135                 140

gca acc cca ggt tct ttg cca gca atc acc gac gct ttg gct gag ggc    2941
Ala Thr Pro Gly Ser Leu Pro Ala Ile Thr Asp Ala Leu Ala Glu Gly
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atc agc gtt aac gtc acc ttg atc ttc tcc gtt gct cgc tac cgc gag    2989
Ile Ser Val Asn Val Thr Leu Ile Phe Ser Val Ala Arg Tyr Arg Glu
        160                 165                 170

gtc atc gct gcg ttc atc gag ggc atc aag cag gct gct gca aac ggc    3037
Val Ile Ala Ala Phe Ile Glu Gly Ile Lys Gln Ala Ala Ala Asn Gly
    175                 180                 185

cac gac gtc tcc aag atc cac tct gtg gct tcc ttc ttc gtc tcc cgc    3085
His Asp Val Ser Lys Ile His Ser Val Ala Ser Phe Phe Val Ser Arg
190                 195                 200                 205

gtc gac gtt gag atc gac aag cgc ctc gag gca atc gga tcc gat gag    3133
Val Asp Val Glu Ile Asp Lys Arg Leu Glu Ala Ile Gly Ser Asp Glu
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gct ttg gct ctg cgc ggc aag gca ggc gtt gcc aac gct cag cgc gct   3181
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tac gct gtg tac aag gag ctt ttc gac gcc gcc gag ctg cct gaa ggt   3229
Tyr Ala Val Tyr Lys Glu Leu Phe Asp Ala Ala Glu Leu Pro Glu Gly
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gcc aac act cag cgc cca ctg tgg gca tcc acc ggc gtg aag aac cct   3277
Ala Asn Thr Gln Arg Pro Leu Trp Ala Ser Thr Gly Val Lys Asn Pro
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gcg tac gct gca act ctt tac gtt tcc gag ctg gct ggt cca aac acc   3325
Ala Tyr Ala Ala Thr Leu Tyr Val Ser Glu Leu Ala Gly Pro Asn Thr
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gtc aac acc atg cca gaa ggc acc atc gac gcg gtt ctg gag cag ggc   3373
Val Asn Thr Met Pro Glu Gly Thr Ile Asp Ala Val Leu Glu Gln Gly
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aac ctg cac ggt gac acc ctg tcc aac tcc gcg gca gaa gct gac gct   3421
Asn Leu His Gly Asp Thr Leu Ser Asn Ser Ala Ala Glu Ala Asp Ala
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gtg ttc tcc cag ctt gag gct ctg ggc gtt gac ttg gca gat gtc ttc   3469
Val Phe Ser Gln Leu Glu Ala Leu Gly Val Asp Leu Ala Asp Val Phe
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cag gtc ctg gag acc gag ggt gtg gac aag ttc gtt gct tct tgg agc   3517
Gln Val Leu Glu Thr Glu Gly Val Asp Lys Phe Val Ala Ser Trp Ser
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gaa ctg ctt gag tcc atg gaa gct cgc ctg aag tagaatcagc acgctgcatc 3570
Glu Leu Leu Glu Ser Met Glu Ala Arg Leu Lys
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Ile Glu Glu Lys Ser Val Val Gly Val Thr Thr Asn Pro Ala Ile Phe
         35                  40                  45

Ala Ala Ala Met Ser Lys Gly Asp Ser Tyr Asp Ala Gln Ile Ala Glu
     50                  55                  60

Leu Lys Ala Ala Gly Ala Ser Val Asp Gln Ala Val Tyr Ala Met Ser
 65                  70                  75                  80
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Ile Asp Asp Val Arg Asn Ala Cys Asp Leu Phe Thr Gly Ile Phe Glu
                 85                  90                  95

Ser Ser Asn Gly Tyr Asp Gly Arg Val Ser Ile Glu Val Asp Pro Arg
            100                 105                 110

Ile Ser Ala Asp Arg Asp Ala Thr Leu Ala Gln Ala Lys Glu Leu Trp
        115                 120                 125

Ala Lys Val Asp Arg Pro Asn Val Met Ile Lys Ile Pro Ala Thr Pro
    130                 135                 140

Gly Ser Leu Pro Ala Ile Thr Asp Ala Leu Ala Glu Gly Ile Ser Val
145                 150                 155                 160

Asn Val Thr Leu Ile Phe Ser Val Ala Arg Tyr Arg Glu Val Ile Ala
                165                 170                 175

Ala Phe Ile Glu Gly Ile Lys Gln Ala Ala Ala Asn Gly His Asp Val
            180                 185                 190

Ser Lys Ile His Ser Val Ala Ser Phe Phe Val Ser Arg Val Asp Val
        195                 200                 205

Glu Ile Asp Lys Arg Leu Glu Ala Ile Gly Ser Asp Glu Ala Leu Ala
    210                 215                 220

Leu Arg Gly Lys Ala Gly Val Ala Asn Ala Gln Arg Ala Tyr Ala Val
225                 230                 235                 240

Tyr Lys Glu Leu Phe Asp Ala Ala Glu Leu Pro Glu Gly Ala Asn Thr
                245                 250                 255

Gln Arg Pro Leu Trp Ala Ser Thr Gly Val Lys Asn Pro Ala Tyr Ala
            260                 265                 270

Ala Thr Leu Tyr Val Ser Glu Leu Ala Gly Pro Asn Thr Val Asn Thr
        275                 280                 285

Met Pro Glu Gly Thr Ile Asp Ala Val Leu Glu Gln Gly Asn Leu His
    290                 295                 300

Gly Asp Thr Leu Ser Asn Ser Ala Ala Glu Ala Asp Ala Val Phe Ser
305                 310                 315                 320

Gln Leu Glu Ala Leu Gly Val Asp Leu Ala Asp Val Phe Gln Val Leu
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Glu Thr Glu Gly Val Asp Lys Phe Val Ala Ser Trp Ser Glu Leu Leu
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Glu Ser Met Glu Ala Arg Leu Lys
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gac gac ctc tcc cgc gag cgc att act tcc ggc aat ctc agc cag gtt   96
Asp Asp Leu Ser Arg Glu Arg Ile Thr Ser Gly Asn Leu Ser Gln Val
             20                  25                  30

att gag gaa aag tct gta gtc ggt gtc acc acc aac cca gct att ttc  144
Ile Glu Glu Lys Ser Val Val Gly Val Thr Thr Asn Pro Ala Ile Phe
         35                  40                  45

gca gca gca atg tcc aag ggc gat tcc tac gac gct cag atc gca gag  192
Ala Ala Ala Met Ser Lys Gly Asp Ser Tyr Asp Ala Gln Ile Ala Glu
     50                  55                  60

ctc aag gcc gct ggc gca tct gtt gac cag gct gtt tac gcc atg agc  240
Leu Lys Ala Ala Gly Ala Ser Val Asp Gln Ala Val Tyr Ala Met Ser
 65                  70                  75                  80

atc gac gac gtt cgc aat gct tgt gat ctg ttc acc ggc atc ttc gag  288
Ile Asp Asp Val Arg Asn Ala Cys Asp Leu Phe Thr Gly Ile Phe Glu
                 85                  90                  95

tcc tcc aac ggc tac gac ggc cgc gtg tcc atc gag gtt gac cca cgt  336
Ser Ser Asn Gly Tyr Asp Gly Arg Val Ser Ile Glu Val Asp Pro Arg
            100                 105                 110

atc tct gct gac cgc gac gca acc ctg gct cag gcc aag gag ctg tgg  384
Ile Ser Ala Asp Arg Asp Ala Thr Leu Ala Gln Ala Lys Glu Leu Trp
        115                 120                 125

gca aag gtt gat cgt cca aac gtc atg atc aag atc cct gca acc cca  432
Ala Lys Val Asp Arg Pro Asn Val Met Ile Lys Ile Pro Ala Thr Pro
    130                 135                 140

ggt tct ttg cca gca atc acc gac gct ttg gct gag ggc atc agc gtt  480
Gly Ser Leu Pro Ala Ile Thr Asp Ala Leu Ala Glu Gly Ile Ser Val
145                 150                 155                 160

aac gtc acc ttg atc ttc tcc gtt gct cgc tac cgc gag gtc atc gct  528
Asn Val Thr Leu Ile Phe Ser Val Ala Arg Tyr Arg Glu Val Ile Ala
                165                 170                 175

gcg ttc atc gag ggc atc aag cag gct gct gca aac ggc cac gac gtc  576
Ala Phe Ile Glu Gly Ile Lys Gln Ala Ala Ala Asn Gly His Asp Val
            180                 185                 190
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tcc aag atc cac tct gtg gct tcc ttc ttc gtc tcc cgc gtc gac gtt   624
Ser Lys Ile His Ser Val Ala Ser Phe Phe Val Ser Arg Val Asp Val
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gag atc gac aag cgc ctc gag gca atc gga tcc gat gag gct ttg gct   672
Glu Ile Asp Lys Arg Leu Glu Ala Ile Gly Ser Asp Glu Ala Leu Ala
    210                 215                 220

ctg cgc ggc aag gca ggc gtt gcc aac gct cag cgc gct tac gct gtg   720
Leu Arg Gly Lys Ala Gly Val Ala Asn Ala Gln Arg Ala Tyr Ala Val
225                 230                 235                 240

tac aag gag ctt ttc gac gcc gcc gag ctg cct gaa ggt gcc aac act   768
Tyr Lys Glu Leu Phe Asp Ala Ala Glu Leu Pro Glu Gly Ala Asn Thr
                245                 250                 255

cag cgc cca ctg tgg gca tcc acc ggc gtg aag aac cct gcg tac gct   816
Gln Arg Pro Leu Trp Ala Ser Thr Gly Val Lys Asn Pro Ala Tyr Ala
            260                 265                 270

gca act ctt tac gtt tcc gag ctg gct ggt cca aac acc gtc aac acc   864
Ala Thr Leu Tyr Val Ser Glu Leu Ala Gly Pro Asn Thr Val Asn Thr
        275                 280                 285

atg cca gaa ggc acc atc gac gcg gtt ctg gag cag ggc aac ctg cac   912
Met Pro Glu Gly Thr Ile Asp Ala Val Leu Glu Gln Gly Asn Leu His
    290                 295                 300

ggt gac acc ctg tcc aac tcc gcg gca gaa gct gac gct gtg ttc tcc   960
Gly Asp Thr Leu Ser Asn Ser Ala Ala Glu Ala Asp Ala Val Phe Ser
305                 310                 315                 320

cag ctt gag gct ctg ggc gtt gac ttg gca gat gtc ttc cag gtc ctg   1008
Gln Leu Glu Ala Leu Gly Val Asp Leu Ala Asp Val Phe Gln Val Leu
                325                 330                 335

gag acc gag ggt gtg gac aag ttc gtt gct tct tgg agc gaa ctg ctt   1056
Glu Thr Glu Gly Val Asp Lys Phe Val Ala Ser Trp Ser Glu Leu Leu
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<213> Corynebacterium glutamicum

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Asp Asp Leu Ser Arg Glu Arg Ile Thr Ser Gly Asn Leu Ser Gln Val
             20                  25                  30
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Ile Glu Glu Lys Ser Val Val Gly Val Thr Thr Asn Pro Ala Ile Phe
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Ala Ala Ala Met Ser Lys Gly Asp Ser Tyr Asp Ala Gln Ile Ala Glu
     50                  55                  60

Leu Lys Ala Ala Gly Ala Ser Val Asp Gln Ala Val Tyr Ala Met Ser
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Ile Asp Asp Val Arg Asn Ala Cys Asp Leu Phe Thr Gly Ile Phe Glu
                 85                  90                  95

Ser Ser Asn Gly Tyr Asp Gly Arg Val Ser Ile Glu Val Asp Pro Arg
            100                 105                 110

Ile Ser Ala Asp Arg Asp Ala Thr Leu Ala Gln Ala Lys Glu Leu Trp
        115                 120                 125

Ala Lys Val Asp Arg Pro Asn Val Met Ile Lys Ile Pro Ala Thr Pro
    130                 135                 140

Gly Ser Leu Pro Ala Ile Thr Asp Ala Leu Ala Glu Gly Ile Ser Val
145                 150                 155                 160

Asn Val Thr Leu Ile Phe Ser Val Ala Arg Tyr Arg Glu Val Ile Ala
                165                 170                 175

Ala Phe Ile Glu Gly Ile Lys Gln Ala Ala Ala Asn Gly His Asp Val
            180                 185                 190

Ser Lys Ile His Ser Val Ala Ser Phe Phe Val Ser Arg Val Asp Val
        195                 200                 205

Glu Ile Asp Lys Arg Leu Glu Ala Ile Gly Ser Asp Glu Ala Leu Ala
    210                 215                 220

Leu Arg Gly Lys Ala Gly Val Ala Asn Ala Gln Arg Ala Tyr Ala Val
225                 230                 235                 240

Tyr Lys Glu Leu Phe Asp Ala Ala Glu Leu Pro Glu Gly Ala Asn Thr
                245                 250                 255

Gln Arg Pro Leu Trp Ala Ser Thr Gly Val Lys Asn Pro Ala Tyr Ala
            260                 265                 270

Ala Thr Leu Tyr Val Ser Glu Leu Ala Gly Pro Asn Thr Val Asn Thr
        275                 280                 285

Met Pro Glu Gly Thr Ile Asp Ala Val Leu Glu Gln Gly Asn Leu His
    290                 295                 300

Gly Asp Thr Leu Ser Asn Ser Ala Ala Glu Ala Asp Ala Val Phe Ser
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Gln Leu Glu Ala Leu Gly Val Asp Leu Ala Asp Val Phe Gln Val Leu
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Glu Thr Glu Gly Val Asp Lys Phe Val Ala Ser Trp Ser Glu Leu Leu
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Glu Ser Met Glu Ala Arg Leu Lys
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